

Industry-driven criteria development of work-ready graduates in the Spatial Sciences

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Introduction

- WiL is being built into all Curtin courses by 2016 to:
 - “ensure our graduates have the **skills demanded by industry**”.
http://www.curtin.edu.au/learningfortomorrow/industry_skilled/work-integrated-learning.cfm
 - To “ensure our graduates can **demonstrate the skills** demanded by **their industry**”.



Introduction

- **Demonstrate the skills**
 - Even great students won't get an interview if they can't.
 - First job is often the hardest.
- **Their industry**
 - Transferrable skills - commonalities (e.g. Curtin graduate attributes – communication etc...).
 - Technical – specific to “their industry”.





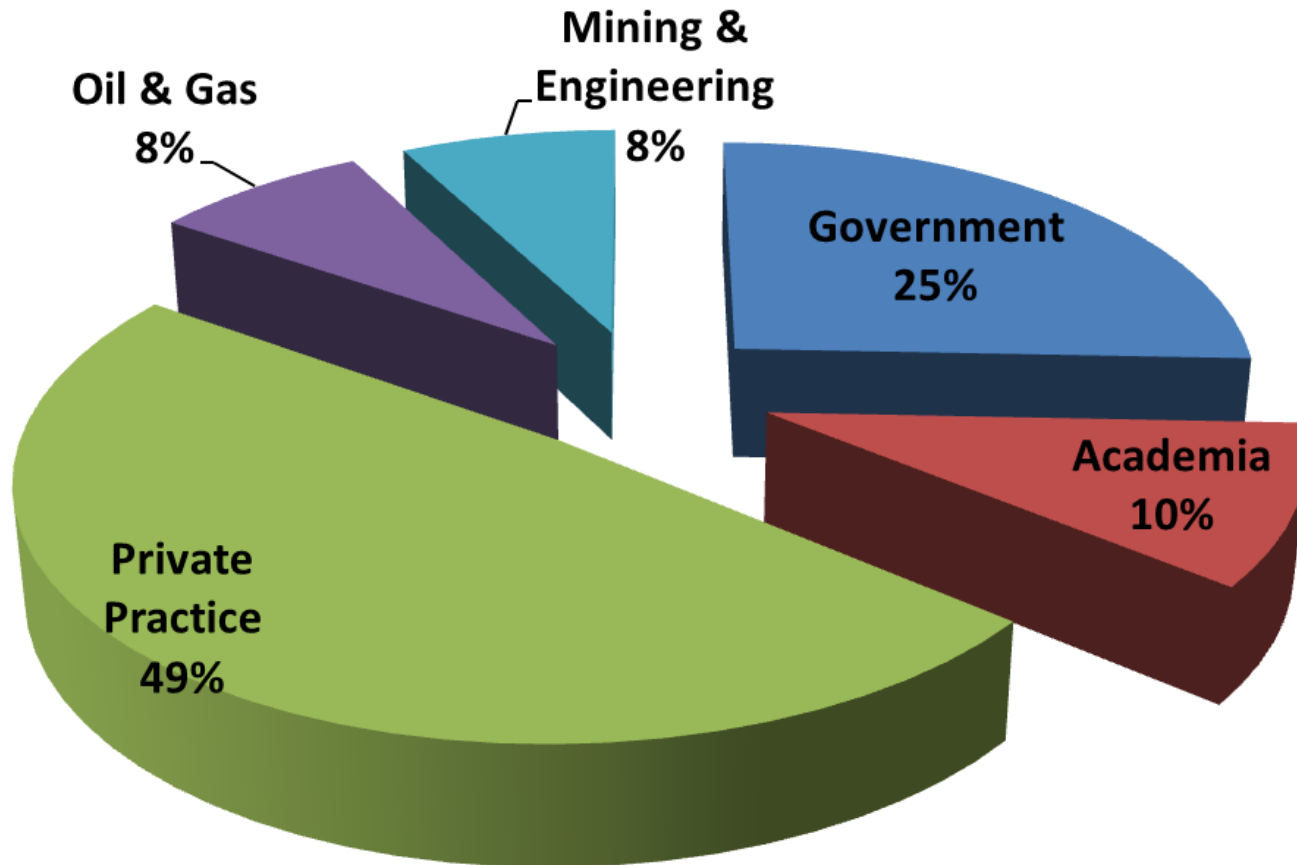
Introduction

- Two years of Spatial Sciences Professional Practice, Curtin University
 - GISc/Remote Sensing;
 - Cadastral Surveying.
- Our aim is to:
 - Ensure unit delivers industry ready students, by better **defining** what that means.
 - Generate **better tools** for student reflection and supervisor assessment.

Though only a handful of students so far..



Criteria Development – Participation by sector





Determining Criteria

Seed criteria
(academics +
literature review)



Round 1
Use seed + gather
all opinions.



Round 2
- Rank importance
of each.



Summarise results



Round 1 – Criteria Groupings

Technical skills

**Specific
GISc/Surveying
Skills**

**Problem
Solving**

**General
Communication**

**Initiative/Establ
ishment**

Transferrable skills



Round 1 of Survey

What **GIS/RS skills** do you consider essential of a work-ready graduate?

Vector/Raster Analyses	Programming/Customisation	Web Mapping	Spatial Databases and Query Language	RS Image Classification	Competency in ArcGIS	Other
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



Display This Question:

If Which discipline are you responding to? **GISsci** Is **Selected** [Edit](#)

Or Which discipline are you responding to? **Both** Is **Selected** [Edit](#)

What **OTHER GIS/RS skills** do you consider essential of a work-ready graduate?

https://curtin.asia.qualtrics.com/SE/?SID=SV_798Xc304ECVQX8F



Technical skills

New Criteria Groupings

**Specific
GISc/Surveying
Skills**

**Initiative/Establi
shment**

**General
Communication**

**Team
Communication**

Problem Solving

**Self
Management**

Transferrable skills



Round 2 – Ranking

- Rank importance of groupings (previous) and within group.

Question 6:

The following criteria relate to GENERAL COMMUNICATION SKILLS. Please rank them (1 = most desirable).

Written (spelling, grammar, clarity) - includes reports/sketches/maps/emails.

1

Verbally expresses thoughts clearly, directly and respectfully (includes phone conversations).

2

Asks the right questions

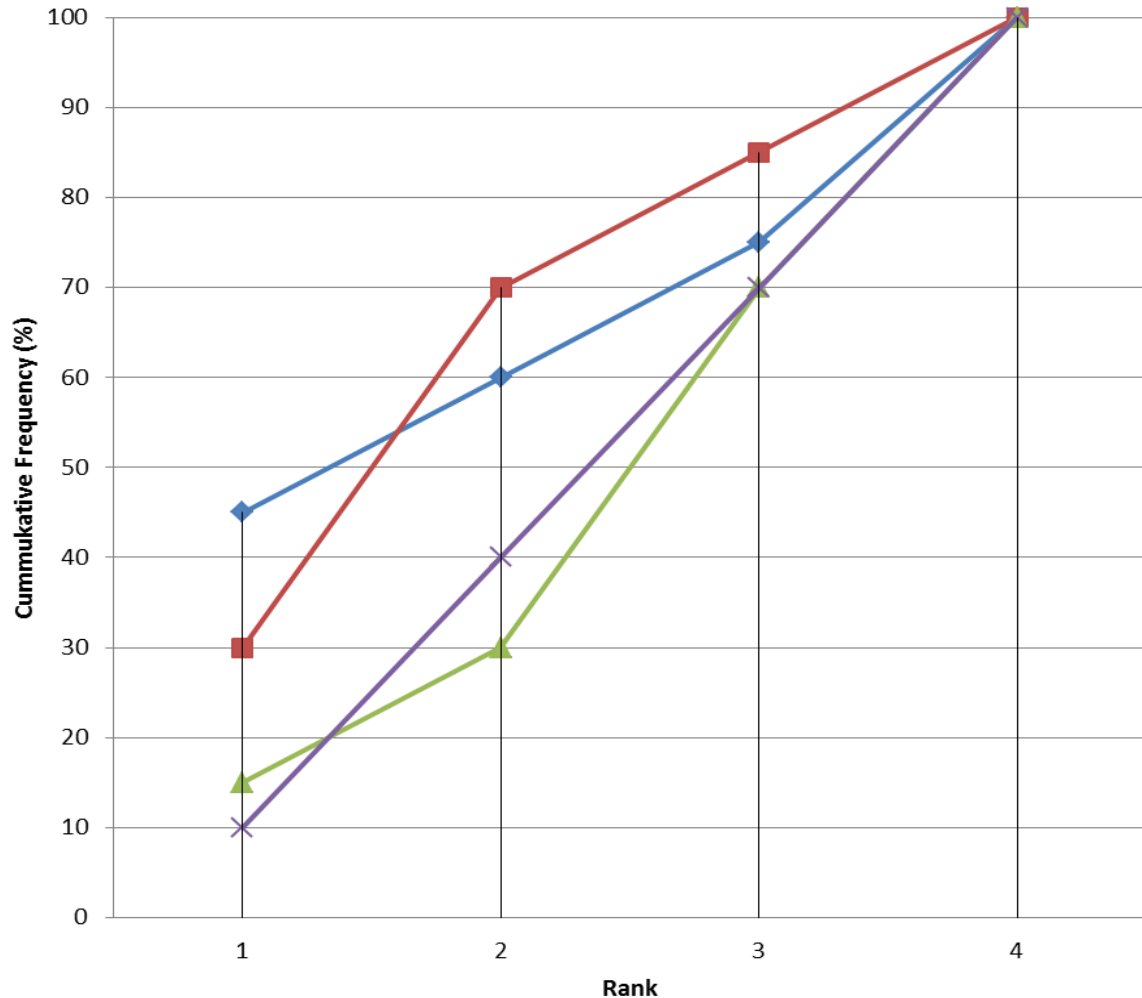
3

Doesn't ask the same questions

4



Summarising Ranks



- Cumulative Frequency of the rank.
- Took rank 1 as top then
- AUC.
 - Blue
 - Red
 - Purple
 - Green



RESULTS

Overall

Technical skills

1. Specific
GISc/Surveying
Skills

2. General
Communication

3. Problem
Solving

4. Self
Management

5.
Initiative/Establi
shment

6. Team
Communication

Transferrable skills



Criteria Breakdown

1. GISc graduates:

Rank	Skill
1	Spatial Databases and Query Language
2	Vector/Raster Analyses
3	Competency in various GIS software incl Open Source
4	Coding languages (e.g. Python)
5	Spatial Modelling
6	Projections and Transformations
7	Web services (e.g. SLIP)
8	Maths and statistics
9	Metadata standards
10	Remote Sensing based Image Processing (optical and radar)
11	Mobile devices (mobile mappers etc...)
12	Photogrammetry skills
13	LiDAR processing
14	Laser Scanning

Reminder:
Graduates...

“Some can be
taught or picked up
quickly later”.



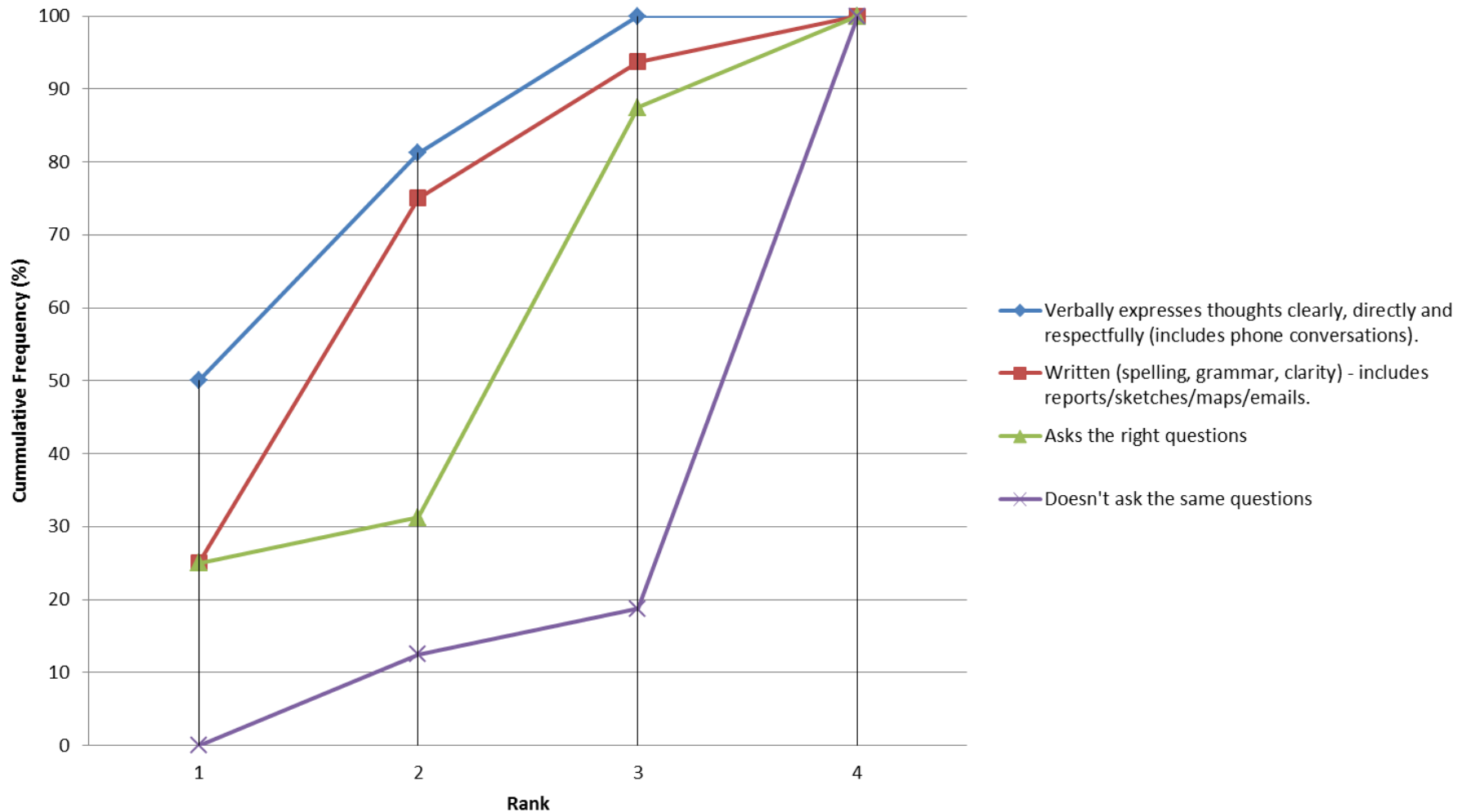
Criteria Breakdown

1. Surveying graduates:

Rank	Skill
1	Competency in the use of all equipment including GPS, total stations, levels.
2	Routine accuracy checks using redundancies
3	Competency in the process of how to do surveys (equipment aside)
4	An understanding of instrument accuracies and limitations
5	Knowledge of absolute and relative accuracies in different surveying equipment
6	Know and follow the regulations of the surveying board
7	Geodetic competency
8	Care for expensive equipment
9	Understanding of onboard computations and the quality metrics presented
10	Basic understanding of different land titles

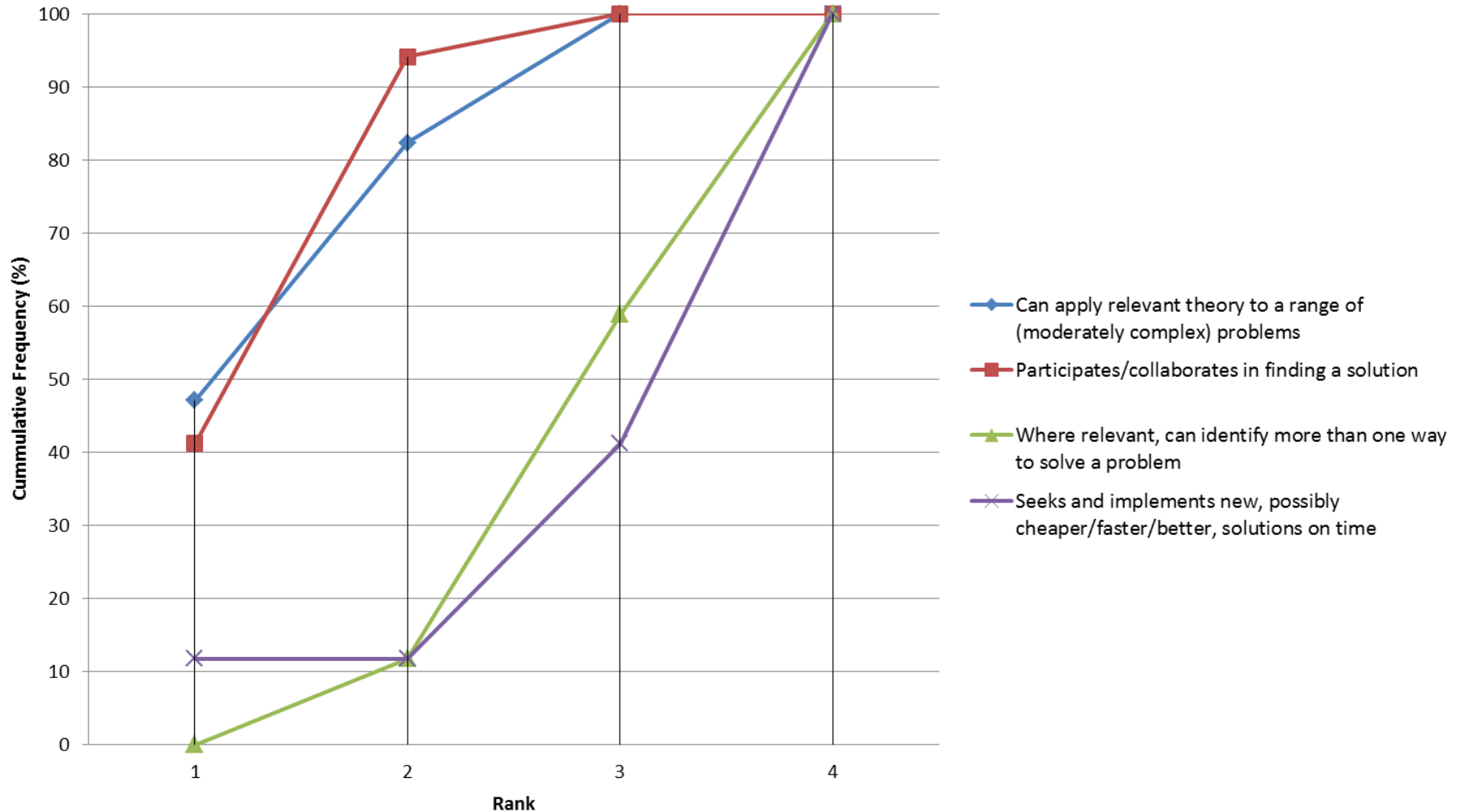
Criteria Breakdown

2. General Communication



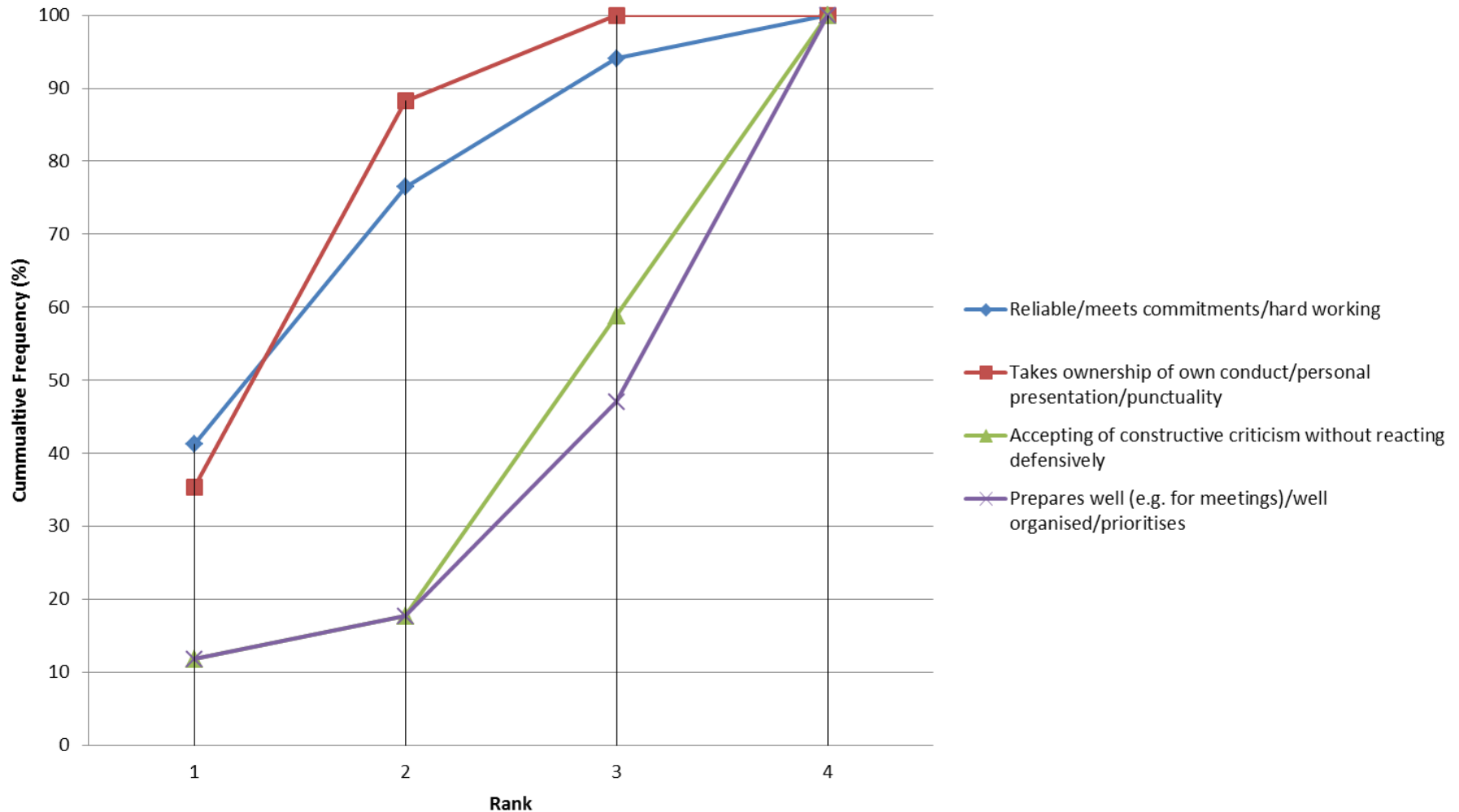
Criteria Breakdown

3. Problem Solving



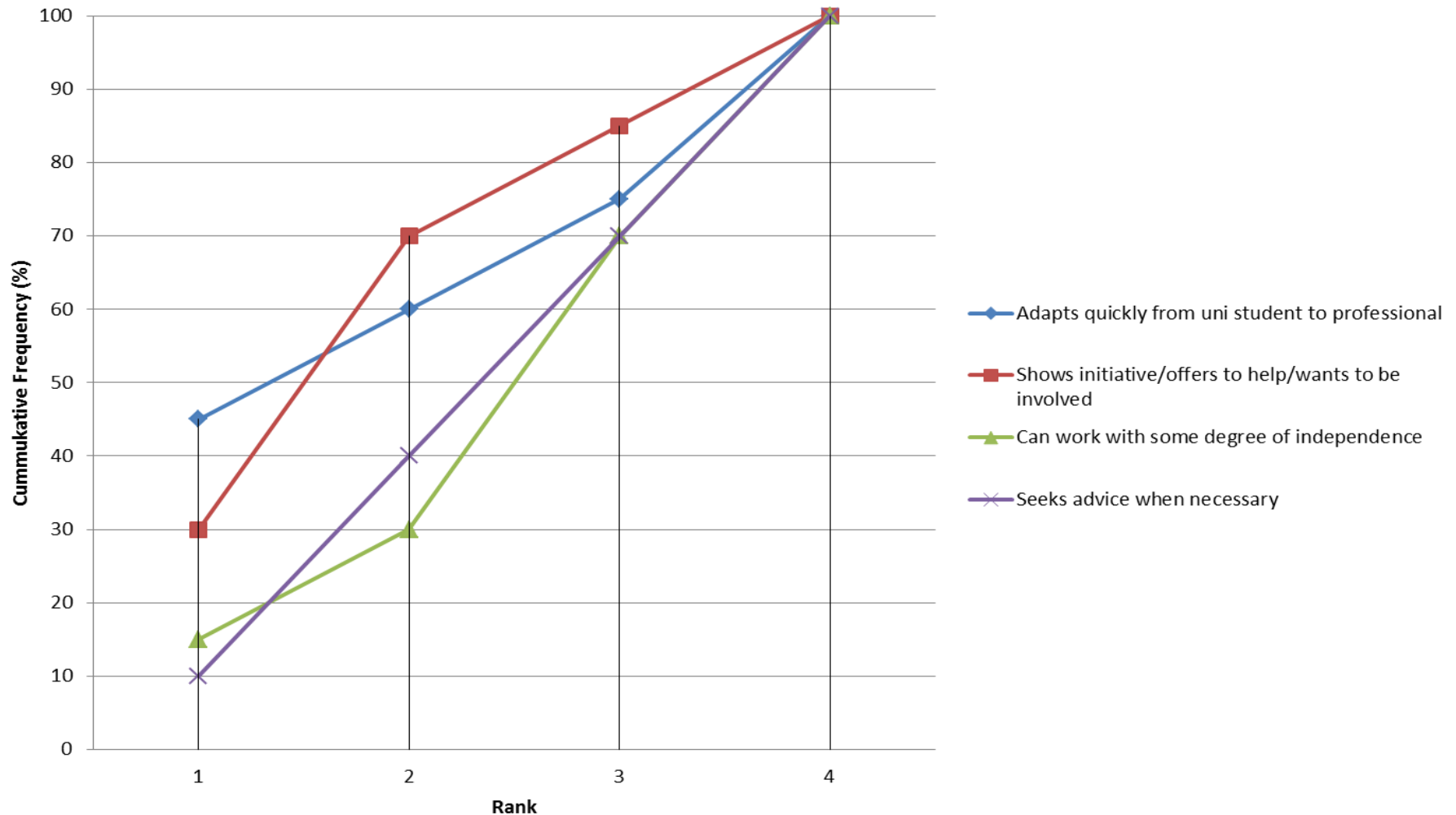
Criteria Breakdown

4. Self Management



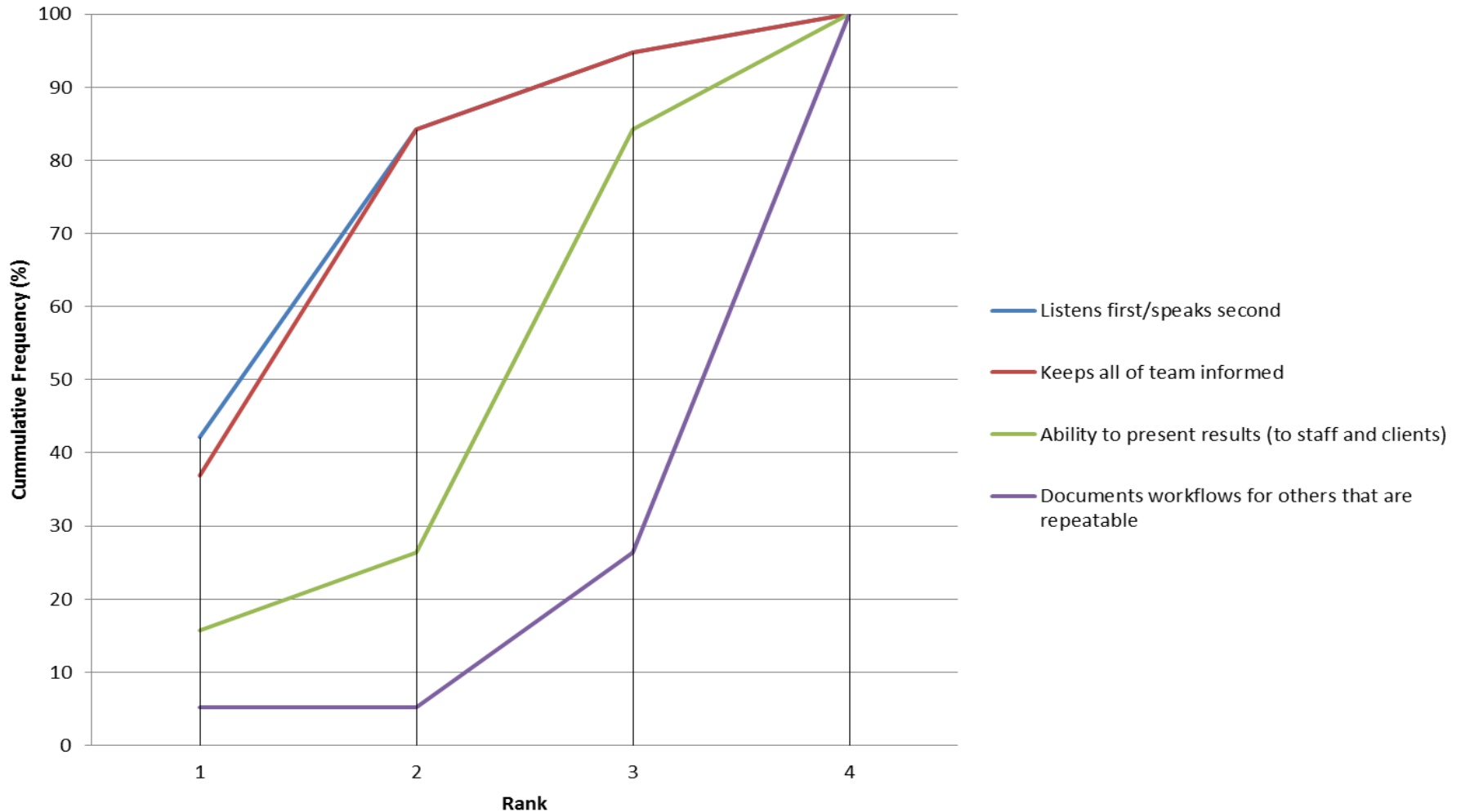
Criteria Breakdown

5. Initiative/Establishment



Criteria Breakdown

6. Team Communication





IMPLEMENTING FINDINGS: NEW OR IMPROVED TOOLS



Current Assessment

Task	%
Portfolio	50
Supervisor	30
Seminar Pres	20



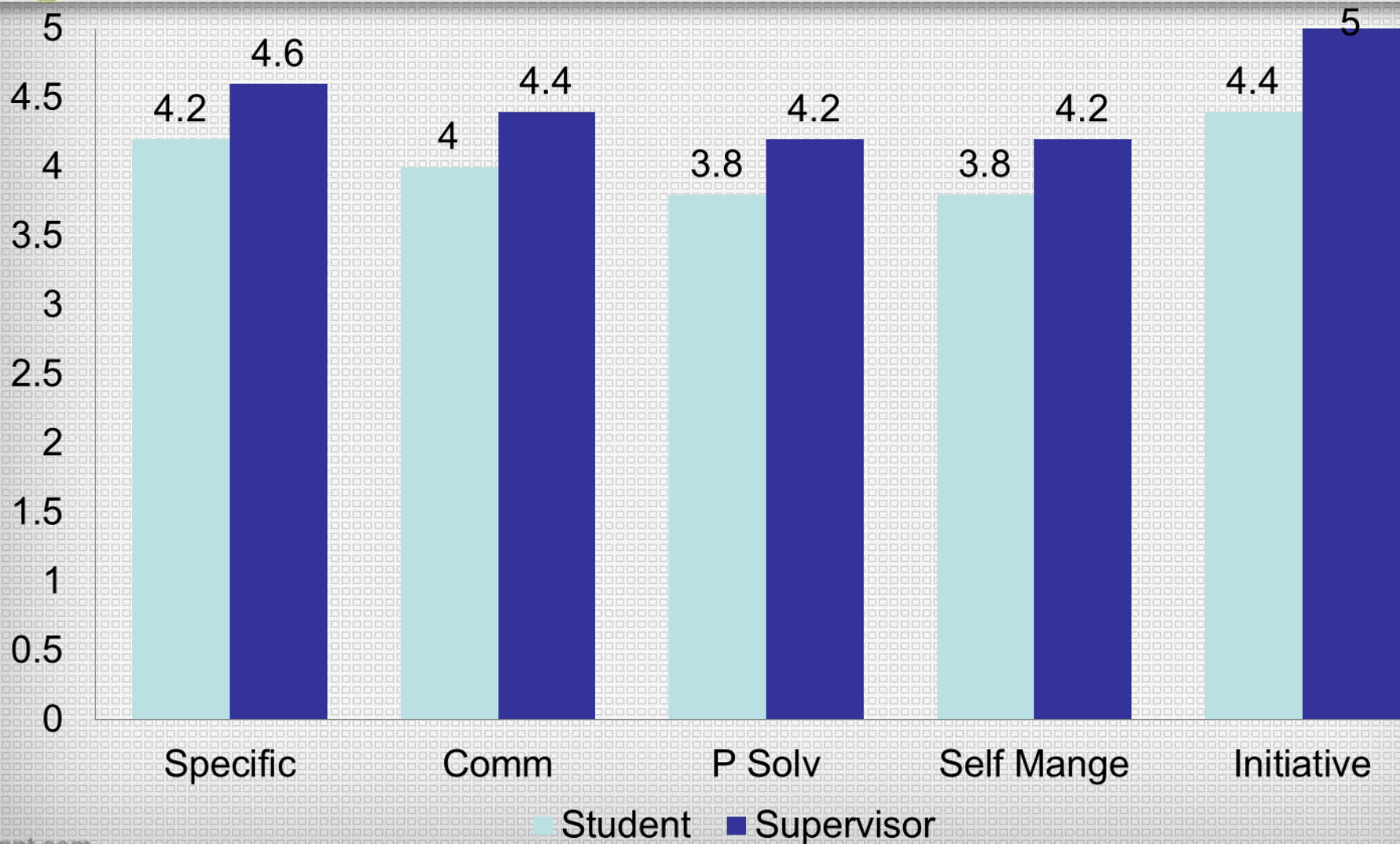
Student Portfolio

Evidencing their skillset

Skillset	Examples	Evidence
Technical	Developed spatial database for XYZ company	Database design doc attached.
General Communication	Presented new workflow to GIS team.	Model document attached.
Problem Solving	We couldn't find a peg so we...	Log book.
Self Management	Managed my time to meet a specific deadline.	Gantt chart
Initiative/Establishing own role	I created my own pre-processing model and ran it overnight.	Landsat mosaic
Team Communication	Together reached a compromise on imagery to purchase vs. accuracy required.	Classified weed map.



Student vs. Supervisor rating





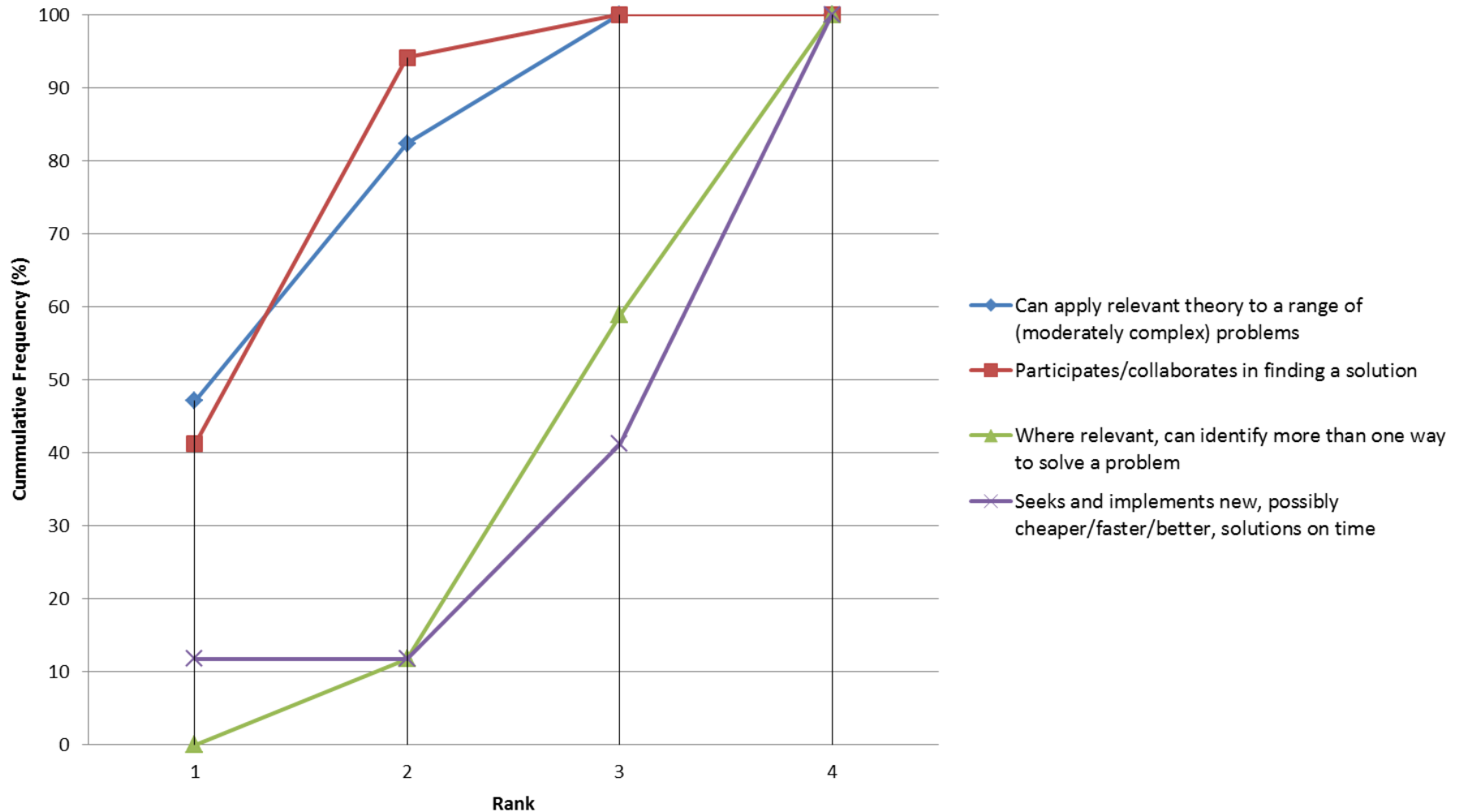
New Rubric and Weights

$$w_j = \frac{n - r_j + 1}{\sum_{i=1}^n (n - r_i + 1)}$$

CRITERIA	RANK	RANK INVERSE	NORMALISED WEIGHT	ADJUSTED WEIGHT
Specific GISc/Surveying Skills	1	6	6/21=0.29	30%
General Communication	2	5	5/21=0.24	25%
Problem Solving	3	4	4/21=0.19	20%
Self Management	4	3	3/21=0.14	10%
Initiative/Establishment in role	5	2	2/21=0.09	10%
Team Communication	6	1	1/21=0.05	5%
Sum:	21	21	1	100%



Take top two of each and convert to rubric





New Rubric

CRITERIA	Poor (25)	Somewhat Poor (50)	Good (75)	Very Good (100)	Total
Specific Skills	Needs a lot of guidance	Needs some guidance	Comfortable after it being demonstrated	Mastered specific skill	30%*Good = 22.5
General Communication	Poor verbal and written comm	Spelling, grammar, manner could improve considerab ly	Spelling, grammar, manner could improve slightly	Excellent verbal, written comm	25%*Poor = 6.25



New Rubric

CRITERIA	Poor (25)	Somewhat Poor (50)	Good (75)	Very Good (100)	Total
Problem Solving	Rarely understands the problem.	Understan ds problem but needs guidance to solve it.	Understands problem but not always the most obvious/ quickest soln.	Applies relevant theory to problem. Is participatin g/collabor ating to find the solution.	20%*Good = 15



New Rubric

CRITERIA	Poor (25)	Somewhat Poor (50)	Good (75)	Very Good (100)	Total
Self Management	Not reliable, not hard working, poor punctuality, poor personal presentation	Reliable and hard working, punctual & takes pride in personal presentati on.	$10\% \times 100 = 10$



New Rubric

CRITERIA	Poor (25)	Somewhat Poor (50)	Good (75)	Very Good (100)	Total
Initiative/Establishment in role	Lacks initiative and drive. Doesn't seem keen to establish in role.	Does what's generally expected but no more.	Shows initiative most of the time.	Quickly adapting to professional life. Wants to be involved. A natural.	$10\% \times 75 = 7.5$



New Rubric

CRITERIA	Poor (25)	Somewhat Poor (50)	Good (75)	Very Good (100)	Total
Team Communication	Speaks first, listens second. Excludes some members deliberately. Can be arrogant.	Under developed skills in team communic ation though this is not deliberate or arrogant.	Developing strong team communicati on skills.	Listens first, speaks second. Canvasses the opinions of others. Keeps all of team informed.	$5\% \times 75 = 3.75$
Total					65



Acknowledgements

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